PropUp Linked Data-based Grouping of Domain-Specific Properties

Challenge 2

CHALLENGED BY:

MADS HOLTEN RASMUSSEN

JEROEN WERBROUCK

CHALLENGE ACCEPTED BY:

ARGHAVAN AKBARIEH

AHLEM RHAYEM

WOJCIECH TECLAW

DAVID FÜRSTENBERG

Contents



Challenge Accepted!



 Numerous stakeholders (e.g. estimator, scheduler, LCA analyst) need specific information for specific tasks (cost estimation, time schedule, LCA analysis) but that information is only indirectly available in the models → querying and grouping is necessary

 Several breakdown structures exist for grouping but not that one that fits all purposes (and they probably never will...)

- Grouping can be easily done in design tools, model viewers or spreadsheets but each way has limitations (requires knowledge in the tool, license fees, outdated information, data silos)
- Grouping is the basis for semantic enrichment but not all information is necessary (or even not wanted) in the design tool

Problem Definition

- 1. Different stakeholders have different requirements
- 2. Existing tools:
 - Need experience
 - Have license fees
 - Create data silos
 - No interoperability
 - Does not cover all domain information
- 3. Stakeholders need an easy and explicit access to their domain information









Concept - PropUp



Implementation - System architecture



Implementation (SPARQL Query -1)

}

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <https://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <https://web-bim/resources/>
PREFIX bot: <https://w3id.org/bot#>
```

```
SELECT distinct ?cl
WHERE{
```

```
# WHAT CLASS?
?item a bot:Element , ?cl
filter(?cl != bot:Element)
```

```
(1) List of Elements
```

PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <https://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <https://web-bim/resources/>
PREFIX bot: <https://w3id.org/bot#>

(2) List of properties of the window element (example)

Implementation (SPARQL Query -2)

}

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <https://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <https://web-bim/resources/>
```

```
SELECT ?v1 (COUNT(?item) AS ?items)
```

```
WHERE{
```

```
?item a ifc:IfcWall .
?item inst:isExternalPsetWallcommon ?v1 .
```

```
} GROUP BY ?v1
```

(3) The number of external and « not external wall in the building

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <http://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <http://web-bim/resources/>
PREFIX bot: <http://waid.org/bot#>
PREFIX rdf: <http://www.w3.org/1999/02/22-rdf-syntax-ns#>
select ?property ?value where {
    values ?x {inst:0dxE1Sy6nDqfpDb5vIMN_Z
        inst:0iEHWY1%24XA8eQeeULq4jE6
    }.
?x ?property ?value .
```

```
(4) List of properties specific elements
```

Implementation (Proof-of-Concept)



Exploitation



Impact

A market-ready proof-of-concept to create the stakeholder-specific information based on stakeholder-specific requirements
 Stakeholders have a platform-neutral and easy to use webbased tool
 Stakeholders are able to interact with the knowledge base and get the required information without a need to have any

→ Saves time and costs, presents information needed in open, standardized structure

knowledge of the structure of the data.

Perspectives

Enhancing the proposed tool using NLP to translate the request of stackholders into SPARQL

Query

Suggesting more complex queries

Proposing federated SPARQL queries

Integrating with SOLID







```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <https://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <https://web-bim/resources/>
PREFIX bot: <https://w3id.org/bot#>
```

```
SELECT distinct ?p ?pName
WHERE{
```

```
} GROUP BY ?v1 ?v2
```

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <https://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <https://web-bim/resources/>
PREFIX bot: <https://w3id.org/bot#>
```

```
SELECT distinct ?p ?pName
WHERE{
```

```
?item a ifc:IfcWall ;
            ?p ?o .
?p rdfs:label ?pName
filter(?p != bot:hasSubElement)
```

```
PREFIX rdfs: <http://www.w3.org/2000/01/rdf-schema#>
PREFIX ex: <https://example.com/>
PREFIX ifc: <http://ifcowl.openbimstandards.org/IFC2X3_Final#>
PREFIX inst: <https://web-bim/resources/>
```

SELECT ?v1 (COUNT(?item) AS ?items)

WHERE{

```
?item a ifc:IfcWall .
?item inst:isExternalPsetWallcommon ?v1 .
```

} GROUP BY ?v1